New Patent Claims 1 and 13 to 38

1. A device (17) for detecting a multiplicity of different analytes in a liquid having a multiplicity of electrodes (15) that are insulated from one another and are arranged on a first side (12) of an electrically nonconductive plate (10) that is impermeable to the liquid, the plate being formed as a flat basic body having a first and a second side, the electrodes (15), at least in part, having an analyte-specific coating or analyte-specific molecules having, at least in part, different specificity and being able to be electrically contact-connected and individually conducted out from a second side (14) of the plate by means of electrical conductors extending through the plate (10), the coating or the molecules being analyte-specific by virtue of having a specific affinity for the analyte or a substance formed owing to the presence of the analyte, and the device having no outgoing lines, the plate (10) being a chip, the electrodes being arranged in the form of an electrode array.

13. The device (17) as claimed in one of the preceding claims, the plate (10) having more than 10, preferably more than 20, 40, 80, 100 or 160, particularly preferably more than 1000, especially more than 10,000 electrodes per cm^2.

14. The device (17) as claimed in one of the preceding claims, the electrodes (15), at least in part, being formed from particles.

15. The device (17) as claimed in one of the preceding claims, the electrodes (15), at least in part, being formed from a non-metallic conductor, in particular carbon.

16. The device (17) as claimed in claim 15, the electrodes (15), at least in part, being pencil, glassy carbon, carbon fiber containing, carbon paste or plastic composite electrodes, preferably polycarbonate electrodes containing elementary carbon, in particular in the form of graphite or carbon black.

17. A measuring device, comprising a device (17) as claimed in one of the preceding claims, in which the electrodes (15) comprise at least one reference electrode and at least one counterelectrode and also a multiplicity of working electrodes, the measuring device containing current/voltage converters, a potentiostat and a means for measuring the currents flowing through the working electrodes, and the electrodes (15) being electrically connected to the potentiostat for generating a predetermined voltage profile between the working electrodes and the reference electrode, one of the current/voltage converters being connected downstream of each of the working electrodes in order to hold all the working electrodes at the same potential.

18. A method for producing a device (17) as claimed in one of claims 1 to 16 having the following steps of:

a) producing a composite of elongate electrode material (15) that is essentially arranged parallel and insulating material surrounding the electrode material (15), the composite being produced by means of

- encapsulating a solid electrode material (15) with a curing insulating material,

- introducing a solid electrode material (15) into essentially parallel cut-outs or perforations (22) of a solid insulating material or into a plastically

deformable insulating material,

- filling pasty or liquid curing electrode material (15) into essentially parallel cut-outs or perforations (22) of a solid one-piece insulating material or of a stacked plate-type insulating material with congruently arranged perforations (22),

- connecting electrode material (15), having a sheathing (18) comprising insulating material, by melting, potting or adhesively bonding the sheathing (18), or

- extruding a composite made of electrode material (15) surrounded by insulating material (18),
and

b) separating the composite essentially perpendicularly to the longitudinal direction of the electrode material (15) by cutting, sawing or by means of a separating disk or by taking apart the stacked plate-type insulating material.

19. A method for producing a device (17) as claimed in one of claims 1 to 16 having the following steps of:

a) providing an electrically nonconductive plate (10) with perforations (22),

b) applying a pasty curing electrode material (15) to a first side (12) of the plate (10),

c) pressing the electrode material (15) into the perforations (22), and

d) removing the electrode material (15) present between the perforations (22) in so far as said

electrode material (15) electrically conductively connects the electrode material (15) present in the perforations.

20. A method for producing a device (17) as claimed in one of claims 1 to 16 having the following steps of:

a) providing an electrically nonconductive plate (10) with perforations (22),

b) placing an aperture mask (24) having holes (26) that correspond to the perforations (22), at least in part, or a screen printing mask having permeable areas that correspond to the perforations, at least in part, onto the first side (12) of the plate (10) such that the holes (26) or the areas are congruent, at least in part, with the perforations (22) of the plate (10),

c) applying a pasty curing electrode material (15) to the aperture mask (24) or screen printing mask,

d) pressing the electrode material (15) into the perforations (22) by way of the holes or permeable areas, and

e) removing the aperture mask (24) or screen printing mask from the plate (10).

21. The method as claimed in one of claims 18 to 20, an analyte-specific coating being applied to the electrode material (15) or analyte-specific molecules being introduced into the electrode material (15).

22. The method as claimed in claim 21, capture molecules, in particular electrochemically inert capture molecules, being applied or introduced as coating or analyte-specific molecules.

23. The method as claimed in claim 21 or 22, in each case different coatings being applied to the electrode material (15) or in each case different analyte-specific molecules being introduced into the electrode material (15).

24. The method as claimed in one of claims 21 to 23, the capture molecules used being, in particular single-stranded, nucleic acids, nucleic acid analogs, ligands, haptens, peptides, proteins, sugars, lipids or ion exchangers.

25. The method as claimed in one of claims 21 to 24, the capture molecules being covalently and/or directionally bound to the electrode material (15) or being synthesized or electrochemically deposited on the electrode material (15).

26. The method as claimed in one of claims 21 to 25, the capture molecules, at least in part, being bound to the electrode material (15) by means of an, in particular electrochemically largely inert, intermediate layer or being synthesized on the intermediate layer.

27. The method as claimed in claim 26, the intermediate layer being formed from silane.

28. The method as claimed in one of claims 18 to 27, the electrode material (15) being coated with at least one semipermeable covering.

29. The method as claimed in claim 28, the electrode material (15) in each case being coated with semipermeable coverings having different permeability.

30. The use of a device (17) as claimed in one of claims 1 to 16 for detecting at least one analyte in a liquid, the liquid being brought into contact with electrodes (15) on the first side (12) of the plate (10) of the device (17) and the electrodes (15) being electrically contact-connected from the second side (14) of said plate.

31. The use as claimed in claim 30, the liquid being brought into contact with the electrodes (15) under conditions under which the analyte or a substance formed owing to the presence of the analyte binds to capture molecules present at the electrodes (15) and the analyte bound to the capture molecules or the substance bound thereto is detected electrically, electrochemically, optically, photoelectrically, enzymatically, by means of electroluminescence or by means of chemiluminescence or by means of a combination thereof.

32. The use as claimed in claim 30 or 31, at least one electrode (15) being coated with a semipermeable covering and selectively only such analytes, decomposition products of analytes or substances which penetrate the covering being detected electrically, electrochemically, optically, photoelectrically, enzymatically, by means of electroluminescence or by means of chemiluminescence or by means of a combination thereof.

33. The use as claimed in one of claims 30 to 32, the analyte being a biomolecule, in particular a nucleic acid, a protein, an antigen, a sugar, a lipid, a cell or a virus.

34. The use as claimed in one of claims 30 to 33, the analyte having a labelling substance.

35. The use as claimed in one of claims 30 to 34, a redox reaction or a catalytic evolution of hydrogen being detected electrochemically.

36. The use as claimed in one of claims 30 to 35, the electrochemical detection being effected by means of differential pulse voltammetry (DPV), chronopotentiometric stripping analysis (CPSA) or detection of a change in resistance or impedance.

37. The use as claimed in one of claims 30 to 36, the electrochemical detection comprising the following steps of:

a) providing a device (17) as claimed in one of claims 1 to 16, the device (17) having at least one counterelectrode and a reference electrode and also a multiplicity of working electrodes,

b) bringing the liquid into contact with the working, counter- and reference electrodes,

c) simultaneously applying a predetermined voltage profile between the working electrodes and the reference electrode, and

d) measuring the currents flowing through the working electrodes, all the working electrodes being held at the same potential during measurement.

38. The use as claimed in one of claims 30 to 37, a potential interval in which essentially only the analyte or the substance causes a signal being chosen for measurement for the electrochemical detection.